https://copyprogramming.com/howto/stm32-series-microcontroller-calculations-of-timer-variables

## How to calculate Prescaler and ARR value?

All variable list:

* Sampling frequency
* Timer clk frequency
* Prescaler value (16 bit)
* ARR value (16 bit)

Note: **PSC and** ARR **need** to have a value within the range of 0 to 65535. And must be unsigned integer number.

We know that,

So can write,

Now we going to find out the value of Prescaler and Auto reload register

If you have a known value on the right-hand side, you may encounter two unknowns on the left-hand side.

At this step we consider a number which is within 0 to 65535 for “Prescaler value”

Here,

Timer CLK = 100 MHz

=100,000,000

Update event frequency = Sampling frequency

= 1 kHz

=1000 Hz (user input)

Initial value of prescaler =0

Now need to check ARR value is valid or invalid

99999 > 65535 so, this value is invalid because it not a 16bit value. And another condition also needs to verify is its unsigned integer or not

Now increase value of prescaler and need to do this calculation again

At this step we consider a number which is within 0 to 65535 for “Prescaler value”

Here,

Timer CLK = 100 MHz

=100,000,000 (fixed)

Update event frequency = Sampling frequency

= 1 kHz

=1000 Hz (user input)

Initial value of prescaler =1

Now need to check ARR value is valid or invalid

< 65535 so, this value is valid because it is 16bit value also an integer number.

So, at this stage we get our desired values for Prescaler value &